

## *Limnephilus moestus* Banks, a Northern Caddisfly in the Atlantic Coastal Plain (Trichoptera: Limnephilidae)

Richard L. Hoffman

Virginia Museum of Natural History  
 Martinsville, Virginia 24112

Charles R. Parker

Biological Resources Division, U. S. G. S.  
 Gatlinburg, Tennessee, 37338

Limnephilid caddisflies as a group tend to be distinctly psychrophilic, with northern continental distributions. As one consequence of this condition "The larvae of the limnephilids are in general rather closely restricted to cold, clear, well oxygenated water" (Flint, 1960: 3). Most members of the Nearctic fauna occur most widely in Canada, with southern extensions -if any - along the Appalachians and Rocky Mountains. Heretofore, *Limnephilus moestus* (Banks, 1908) has been an exemplar of such biogeographic constraints. It ranges across North America from Greenland to British Columbia, southward to Utah and Colorado in the Rockies and to West Virginia and Delaware in the East. Nearly all of the localities east of the Great Plains lie within the area covered by Wisconsin stage glaciation. While it is not unusual for plants and animals with obviously boreal distributions to occur southward in eastern United States, such disjunct outliers are normally associated with high elevations which provide the requisite cool habitats. Contrary to this logical constraint, *Limnephilus moestus* has been found in recent years virtually at sea level from New Jersey to southeastern North Carolina.

The earliest Coastal Plain collection seems to have been made by the first author at Lake Drummond in the Dismal Swamp, City of Chesapeake, Virginia, on 19 May 1963. Using a sheet illuminated by a gasoline lantern at a former hunting lodge located at the entry of the Jericho Ditch into the lake, he obtained a sample of nine species of Trichoptera. Dr. Herbert H. Ross, who identified the material (all in INHS), wrote (in litt. to RLH 16 October 1963) that "The remarkable circumstance about this list is that it is typical of a spring fed stream in Long Island or in the Adirondacks rather than what we consider to be the fauna of a

southern swamp." At the time, RLH knew nothing about caddisfly distribution and attached no special significance to the appearance of *Limnephilus moestus* (7 ♂♂) in Ross's list (although, obviously, it is one of the species that evoked his comment). A second Virginia record was obtained through a single male (VMNH) taken at a blacklight trap operated by Steven M. Roble at the Blackwater Ecologic Preserve, ca. 4 mi. S of Zuni, Isle of Wight Co., Virginia. In identifying this material, the second author realized its geographic significance and his comment about it (in litt. to RLH) evoked the memory of the Lake Drummond list and led to a search of literature relevant to the "normal" range of this species.

A record for the Coastal Plain of Delaware has been published (Lake, 1984), based on a single female taken at Middletown, New Castle Co., on 30 May 1981. Dr. Flint pointed out his own capture of 14 specimens (USNM) at Lakehurst, Ocean Co., New Jersey, adding the Coastal Plain of this state to the register. Lastly, and certainly most noteworthy, is a series of three *moestus* in the USNM collection from Lake Waccamaw, Columbus Co., North Carolina, taken 10 May 1985 by W. E. Steiner and Andy Gerberich. This locality is 300 km southwest of Lake Drummond, and the presence of *moestus* there must be regarded as remarkable, perhaps the southernmost known record of the genus in North America. The occurrence of *moestus* in Lake Drummond at least has a palaeoecological explanation: as recently as 18,000 YBP the entire region (then pre-swamp!) was invested in northern spruce-fir-jack pine forest (Whitehead, 1973). Survival of populations of boreal species remaining behind during postglacial warming intervals and biome shifts would have been enhanced by the influence of cold springs along the

western edge of the Dismal Swamp. Explanation of the population near Zuni is less facile. The specimen could have only come from the nearby Blackwater River, an appropriately named low-gradient Tidewater stream characterized by midsummer warmth and lowered oxygen content. Near the collecting site, however, the river courses near the base of steep bluffs some 5-10 m in height; cold springs or seeps at the base of these bluffs, feeding into floodplain pools, could produce microhabitats capable of sustaining this relict waif species. Environmental conditions at the Lake Waccamaw capture site are unknown to us.

*Limnephilus moestus* becomes another facet of the increasingly complicated mosaic, in the Virginia Coastal Plain, of boreal relicts of postglacial warming existing sympatrically with austral relicts left behind from post-Hypsithermal cooling of local temperatures. At Lake Drummond, it was taken along with the holotype of the thermophilic caddisfly *Ceraclea protonepha* Morse & Ross, there near the northeastern extremity of that species' distribution.

In the central Appalachians, the southernmost records for the species are in eastern West Virginia: Blackwater Falls, Spruce Knob Lake, and Cranberry Glades (all USNM), in high, cool, subboreal situations in which *moestus* might be expected to occur. So far there are no records for Virginia despite considerable collecting effort only a few miles from the Spruce

Knob site; almost certainly however a Virginia population will be located somewhere in Alleghany, Bath, or Highland counties.

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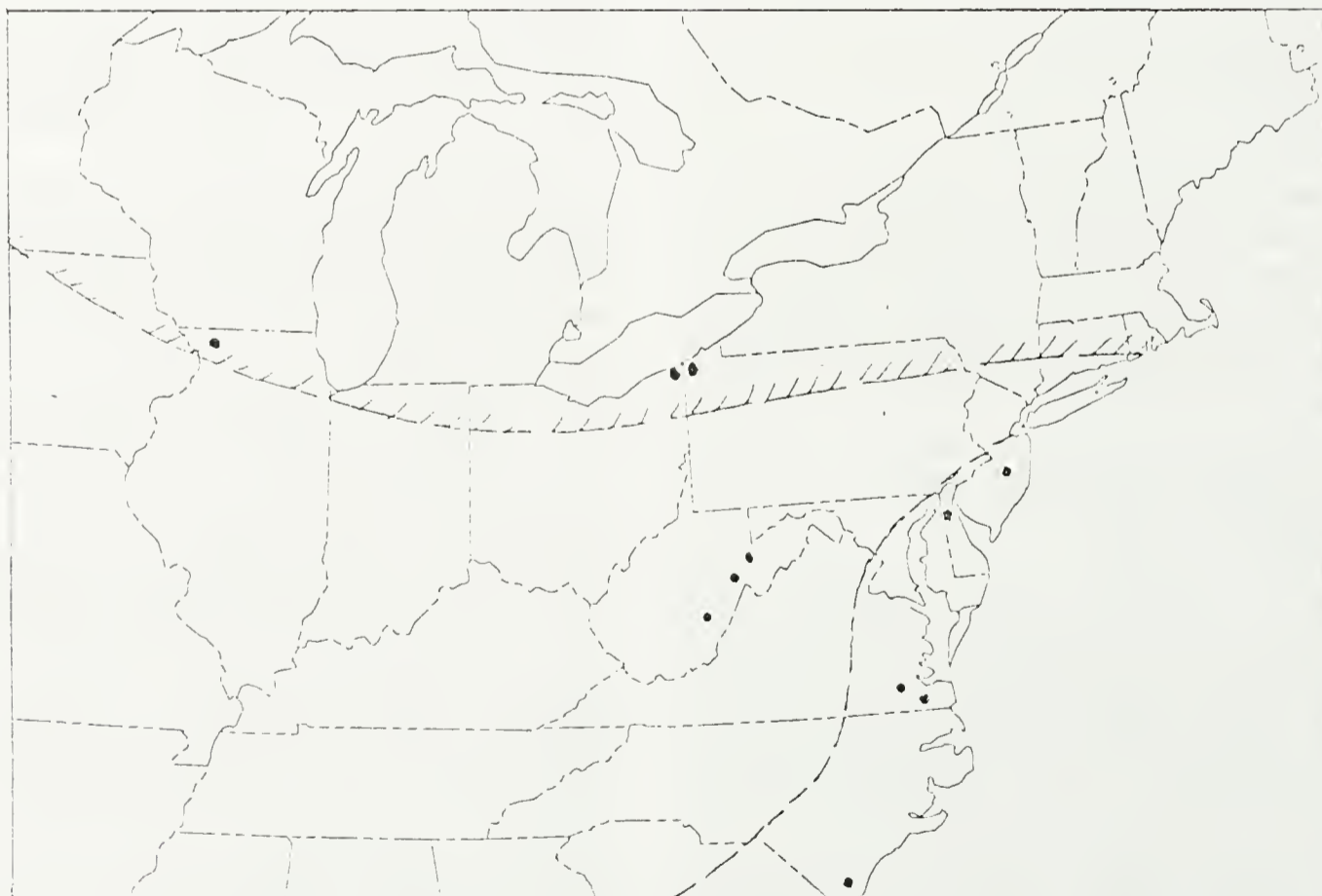


Fig. 1. Central eastern North America, showing the conterminous range of *Limnephilus moestus* (north of the hatched line, with the southernmost known Appalachian records in West Virginia and the Coastal Plain localities discussed in this paper.